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PATENT APPLICATION

ATTORNEY DOCKET NO. 200300074-1

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IN THE  
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Xiao-An Zhang

Confirmation No.: 9152

Application No.: 10/614,855

Examiner: Timothy L. Rude

Filing Date: July 7, 2003

Group Art Unit: 2871

Title: 3-D MOLECULAR ASSEMBLY AND ITS APPLICATIONS FOR MOLECULAR DISPLAY AND  
MOLETRONICS

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Commissioner For Patents  
PO Box 1450  
Alexandria, VA 22313-1450

TRANSMITTAL OF REPLY BRIEF

Transmitted herewith is the Reply Brief with respect to the Examiner's Answer mailed on October 9, 2008.

This Reply Brief is being filed pursuant to 37 CFR 1.193(b) within two months of the date of the Examiner's Answer.

(Note: Extensions of time are not allowed under 37 CFR 1.136(a))

(Note: Failure to file a Reply Brief will result in dismissal of the Appeal as to the claims made subject to an expressly stated new ground rejection.)

No fee is required for filing of this Reply Brief.

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Respectfully submitted,

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Docket No. 200300074-1

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:

Applicant: Xiao-An Zhang

Application No.: 10/614,855

Filed: July 7, 2003

Title: 3-D Molecular Assembly and its Applications for Molecular  
Display and Moletronics

Examiner: Timothy L. Rude

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REPLY BRIEF UNDER 37 CFR 41.41(a)(1)

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Commissioner of Patents and Trademarks  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Examiner's Answer dated October 9, 2008, applicant replies as follows:

REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

RELATED APPEALS AND INTERFERENCES

Applicant's representative has not identified, and does not know of, any other appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

STATUS OF AMENDMENTS

No Amendment After Final is enclosed with this brief. The last Amendment was filed December 22, 2006.

SUMMARY OF CLAIMED SUBJECT MATTERIndependent Claim 1

Claim 1 is directed to a three-dimensional molecular switch assembly, formed on a substrate. The molecular switch assembly comprises a first monolayer of seed molecules (Current Application page 11, lines 5-8; page 14, line 12 – page 15, line 2) for initiating self-assembled molecular growth, the first monolayer formed on the substrate (Current Application page 11, lines 8-13); a second monolayer of active molecules (Current Application page 11, lines 14-15; page 15, lines 3-24) comprising a plurality of rotor moieties and stator moieties (Current Application page 3, lines 28-31; page 18, lines 30-31; page 19, lines 5-6), with one rotor moiety supported between two stator moieties (Current Application page 19, line 6, Figure 2), the second monolayer of active molecules formed on the first monolayer of seed molecules (Current Application page 15, lines 3-12), with a one-to-one correspondence between molecules in the first monolayer and the second monolayer (Current Application page 15, lines 25-29); a third monolayer of spacer molecules, formed on the second monolayer of active molecules (Current Application page 11, lines 16-17), with a one-to-one correspondence between molecules in the second monolayer and the third monolayer (Current Application page 15, lines 30-31, Figure 3e); and a plurality of alternating second monolayers and third monolayers (Current Application page 11, lines 18-20) having the one-to-one correspondence. The active molecules are switchable between two different states by an applied external electric field (Current Application page 3, line 23 – page 4, line 3; page 5, lines 17-23).

Dependent Claim 13

Claim 13 is directed to the three-dimensional molecular switch assembly of Claim 1 wherein the substrate comprises a first electrode (Current Application page 13, line 26) and wherein the molecular assembly further comprises a second electrode formed on an uppermost monolayer (Current Application page 13, lines 26-28).

Independent Claim 17

Claim 17 is directed to a method for fabricating a three-dimensional switch molecular assembly, formed on a substrate. The method comprises forming on the substrate a first monolayer of seed molecules for initiating self-assembled molecular growth (Current Application page 11, lines 5-13; page 14, line 12-page 15, line 2); forming, via molecular self-assembly, on the first monolayer a second monolayer of active molecules comprising a plurality of rotor moieties and stator moieties (Current Application page 3, lines 28-31; page 11, lines 14-15; page 15, lines 3-24; page 18, lines 30-31; page 19, lines 5-6), with one rotor moiety supported between two stator moieties (Current Application page 19, line 6, Figure 2), with a one-to-one correspondence between molecules in the first monolayer and the second monolayer (Current Application page 15, lines 25-29); forming, via molecular self-assembly, on the second monolayer a third monolayer of spacer molecules (Current Application page 11, lines 16-17), with a one-to-one correspondence between molecules in the second monolayer and the third monolayer (Current Application page 15, lines 30-31, Figure 3e); and forming, via molecular self-assembly, a plurality of alternating second monolayers and third monolayers having the one-to-one correspondence (Current Application page 11, lines 18-20). The active molecules are switchable between two different states by an applied external electric field (Current Application page 3, line 23 – page 4, line 3; page 5, lines 17-23).

Dependent Claim 29

Claim 29 is directed to the method of Claim 17 wherein the substrate comprises a first electrode (Current Application page 13, line 26) and wherein the method further comprises forming a second electrode on an uppermost monolayer (Current Application page 13, line 26-28).

Dependent Claims 33-40

Claim 33 is directed to the three-dimensional molecular switch assembly of Claim 1 as a bi-stable molecular color switch (Current Application page 10, lines 19-22). Claim 34 is directed to the three-dimensional molecular switch assembly of Claim 33 wherein the bi-stable molecular color switch is switchable by an applied external electric field between a colored state and a transparent state (Current Application page 3, line 31-page 4, line 1). Claim 35 is directed to the three-dimensional molecular switch assembly of Claim 34 wherein color change occurs through a molecular conformation change that alters the degree of electron conjugation across the active molecule and, thereby, the highest occupied molecular orbital – lowest unoccupied molecular orbital states of the active molecule (Current Application page 3, lines 25-28). Claim 36 is directed to the three-dimensional molecular switch assembly of Claim 1 as a bi-stable molecular switch (Current Application page 5, lines 10-13). Claim 37 is directed to the method of Claim 17 wherein the three-dimensional molecular switch assembly is a bi-stable molecular color switch (Current Application page 5, lines 6-13). Claim 38 is directed to the method of Claim 37 wherein the bi-stable molecular color switch is switchable by an applied external electric field between a colored state and a transparent state (Current Application page 4, line 30-page 5, line 1). Claim 39 is directed to the method of Claim 38 wherein color change occurs through a molecular conformation change that alters the degree of electron conjugation across the active molecule and, thereby, the highest occupied molecular orbital – lowest unoccupied molecular orbital states of the active molecule (Current Application page 3, lines 25-28). Claim 40 is directed to the method of Claim 17 wherein the three-dimensional molecular switch assembly is a bi-stable molecular switch (Current Application page 5, lines 6-13).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 1, 13, 17, and 29 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 5,275,924 (“Devonald”) in view of U.S. Patent Application 2002/0075557 (“Zhang1”).
2. Claims 33-40 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 5,275,924 (“Devonald”) in view of U.S. Patent Application 2002/0075557

(“Zhang1”), and further in view of U.S. Patent 6,556,470 (“Vincent”).

3. Claims 1, 13, 17, and 29 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 5,275,924 (“Devonald”) in view of U.S. Patent Application 2002/0075420 (“Zhang2”).

4. Claims 33-40 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 5,275,924 (“Devonald”) in view of U.S. Patent Application 2002/0075420 (“Zhang2”), and further in view of U.S. Patent 6,556,470 (“Vincent”).

### ARGUMENT

On pages 6 and 13 of the Appeal Brief filed on May 27, 2008, Applicant’s representative argued that Devonald does not teach or suggest “seed molecules” for self assembled molecular growth as taught by claims 1 and 17. In response to Applicant’s representative’s arguments, in the Examiner’s Answer, beginning at the bottom of page 15 and ending on page 16, the Examiner asserts that “the Examiner does not need to match Applicant’s lexicography.” The Examiner also asserts that “[a]ny molecule that serves for further growth may be called a ‘seed molecule.’” The Examiner then proceeds to argue that “Langmuir-Blodgett films are well-known to serve as ‘seed molecules’, ‘seed crystals’, ‘seed layers’, or seed crystal layer’.” Here the Examiner is attempting to broaden the meaning of the claim terms “seed molecule” beyond the meaning provided in the current application. However, this is an incorrect interpretation of claim terminology. The Federal Circuit holds that

“[t]he claims, of course, do not stand alone. Rather, they are part of ‘a fully integrated written instrument,’ *Markman*, 52 F.3d at 978, consisting principally of a specification that concludes with the claims. For that reason, claims ‘must be read in view of the specification, of which they are a part.’ *Id.* At 979. As we stated in *Vitronics*, the specification ‘is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.’ 90 F.3d at 1582.”

The Federal Circuit also states that “the best source for discerning the proper context of claim terms is the specification wherein the patent applicant describes the invention.” *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1360 (Fed. Cir. 2004). The detailed description of the current application describes seed molecules 22 in paragraphs

0045, 0049, 0051, 0052, and provides examples and illustrations of seed molecules in Figures 2 and 3 of the current application. As shown in Figures 2 and 3 and described in accompanying paragraphs 0059-0061, the seed molecules referred to in the current application and claims are not crystals. The Examiner has not cited evidence that Devonald teaches or suggest the use of seed molecules as described in the current application and claims 1 and 17.

On pages 11, 14, and 15 of the Appeal Brief, Applicant's representative asserts that the Examiner has not explained how to combine the materials of Zhang1 with the materials of Devonald or the materials of Zhang2 with the materials of Devonald. In the Examiner's Answer, the Examiner responds with the following statements:

“One does not need to combine the materials of Zhang1 with the materials of Devonald.

One of ordinary skill in the art would know to use compatible ‘seed molecules’ and other materials to promote ‘molecular self-assembly’ because that is pivotal to how all the species technologies of the genus work.

One of ordinary skill in the art would not be confused by disclosure of the Devonald when considering the teachings of Zhang1.

One of ordinary skill in the art would obviously not retain anything of Devonald that would be incompatible with the molecular self-assembly of Zhang1 because knowledge of such compatibilities is mainstream to molecular self-assembly to produce.

Devonald teaches broadly the use of molecular self-assembly to produce stacking of multiple layers of like or alternate nature to produce any of a wide range of electronically and non-electronically tunable and switching optical devices.”

First, as explained in the background of the current application on pages 6-7 of the Appeal Brief molecular self-assembly as taught in the current application is not the same as Langmuir-Blodgett. Second, the statements provided by the Examiner do not provide a persuasive argument. These statements are conclusory statements.

A statement that modifications of the prior art to meet the claimed invention would have been “well within the ordinary skill of the art at the time the invention claimed was made . . . is not sufficient to establish prima facie case of obviousness without some objective reason to combine the teachings of the references. Ex parte Levengood, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). “Rejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with rational underpinning to support the legal conclusion of obviousness.” KSR 550 U.S. at \_\_\_, 82 USPQ2d at 1396.

As explained in the Appeal Brief, there is no objective reason to combine Devonald with Zhang1 or Zhang2. The issue is not whether someone who is skilled in the art would be

confused by the disclosure of Devonald when considering the teachings of Zhang1 or Zhang2. The issue is that Devonald and Zhang1 and Zhang2 teach fundamentally different molecular systems that are operated in completely different ways. The Examiner has not provided convincing evidence as to why one who is skilled in the art would combine the non-centrosymmetric molecules of Devonald whose operation is predicated on the nonlinear optical properties of these molecules with the stator and rotator molecules of Zhang1 and Zhang 2, which are operated in a fundamentally different manner. “[T]he claimed combination cannot change the principle of operation of the primary reference or render the reference inoperable for its intended purpose.” See M.P.E.P. §2145.III.

Applicant respectfully submits that all statutory requirements are met and that the present application is allowable over all the references of record. Therefore, Applicant respectfully requests that the present application be passed to issue.

Respectfully submitted,  
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